

CLAIMS

What is claimed is:

1. An interconnect structure for receiving a solder contact comprising:
 - a substrate;
 - a contact pad disposed over a surface of the substrate, an inner portion of the contact pad including a compliant layer and a conductive layer that is disposed over the compliant layer; and
 - an insulative mask disposed over the contact pad, the insulative mask including an opening that is aligned over and that exposes the inner portion, the inner portion of the contact pad having sufficient flexibility to distribute mechanical stress applied to the contact pad.
2. The interconnect structure of claim 1, the compliant layer being formed from a compliant material that has an elastic modulus lower than the elastic modulus of the material used to form the conductive layer.
3. The interconnect structure of claim 2, the conductive layer comprising a conductive metal and the compliant layer comprising at least one of a metal, a non-metal, a ceramic, and a composite.
4. The interconnect structure of claim 1, the conductive layer comprising copper and the compliant layer comprising a compliant material having an elastic modulus lower than the elastic modulus of copper.
5. The interconnect structure of claim 1, the compliant layer being more flexible than the conductive layer and being formed from a compliant material that has an elastic modulus higher than the elastic modulus of the material used to form the conductive layer.

6. The interconnect structure of claim 5, the compliant layer comprising at least one of pores, apertures, and voids to provide the compliant layer with a flexibility greater than the conductive layer.
7. The interconnect structure of claim 1, the contact pad further including an outer portion, the outer portion comprising at least one conductive layer, the at least one conductive layer of the outer portion having a thickness substantially greater than the thickness of the conductive layer of the inner portion.
8. The interconnect structure of claim 7, the conductive layer of the inner portion being substantially more flexible than the at least one conductive layer of the outer portion.
9. The interconnect structure of claim 1, the opening exposing a substantially planar contact surface.
10. The interconnect structure of claim 1 further including a solder contact attached to the contact surface, the solder contact including a contact portion defined by the opening of the insulative mask.
11. The interconnect structure of claim 10, the contact surface including at least one protrusion that extends within the opening from the contact surface, the protrusion being defined by the conductive layer of the inner portion.
12. The interconnect structure of claim 11, the protrusion substantially improving shear and attach yield of the solder contact to the contact pad.
13. An interconnect structure for receiving a solder contact comprising:
a substrate;

a contact pad disposed over a surface of the substrate, the contact pad including an inner portion and an outer portion, the inner portion of the contact pad including a compliant layer and a conductive layer that is disposed over the compliant layer; and

an insulative mask disposed over the contact pad, the insulative mask including an opening that is aligned over and that exposes a contact surface of the contact pad, the contact surface being defined by the inner portion and part of the outer portion.

14. The interconnect structure of claim 13, the compliant layer being formed from a compliant material that has an elastic modulus lower than the elastic modulus of the material used to form the conductive layer.

15. The interconnect structure of claim 13, the conductive layer comprising copper and the compliant layer comprising a compliant material having an elastic modulus lower than the elastic modulus of copper.

16. The interconnect structure of claim 13, the compliant layer being more flexible than the conductive layer and being formed from a compliant material that has an elastic modulus higher than the elastic modulus of the material used to form the conductive layer.

17. The interconnect structure of claim 13, the outer portion comprising at least one conductive layer, the at least one conductive layer of the outer portion having a thickness substantially greater than the thickness of the conductive layer of the inner portion.

18. The interconnect structure of claim 11, the conductive layer of the inner portion being substantially more flexible than the at least one conductive layer of the outer portion.

19. The interconnect structure of claim 13, the contact surface including at least one protrusion that extends within the opening from the contact surface, the protrusion being defined by a surface of the conductive layer of the inner portion.

20. The interconnect structure of claim 19 further including a solder contact attached to the contact surface, the solder contact including a contact portion defined by the opening of the insulative mask.
21. The interconnect structure of claim 20, the protrusion substantially improving shear and attach yield of the solder contact to the contact pad.
22. A method of fabricating an interconnect structure for a solder contact, the method comprising:
 - forming a contact pad over a substrate, the contact pad can including an inner portion that comprises a compliant layer and a conductive layer that is disposed over the compliant layer; and
 - forming an insulative mask over the contact pad, the insulative mask including an opening aligned over the inner portion of the contact pad that exposes a contact surface of the conductive layer, the inner portion of the contact pad having sufficient flexibility to distribute mechanical stress applied to the contact pad and mitigate damage to the interconnect structure.
23. The method of claim 22, further comprising attaching a solder contact to the contact surface, the insulative mask defining a contact portion of the solder contact.
24. The method of claim 22, the compliant layer comprising a compliant material that has an elastic modulus lower than the elastic modulus of the material used to form the conductive layer.
25. The method of claim 24, the conductive layer disposed over the compliant layer comprising copper and the compliant layer comprising a compliant material having an elastic modulus lower than the elastic modulus of copper.

26. The method of claim 22, the compliant layer being more flexible than the conductive layer and being formed from a compliant material that has an elastic modulus higher than the elastic modulus of the material used to form the conductive layer.

27. The method of claim 22, further comprising forming the contact pad by:
forming a first conductive layer over the substrate,
forming an opening in the first conductive layer,
forming a compliant layer in the opening of the first conductive layer, and
forming a second conductive layer over the compliant layer and the first conductive layer, the thickness of the second conductive layer being substantially less than the thickness of the first conductive layer.